2020

Change Agents (2020)

University of Mississisppi. Office of Research and Sponsored Programs.

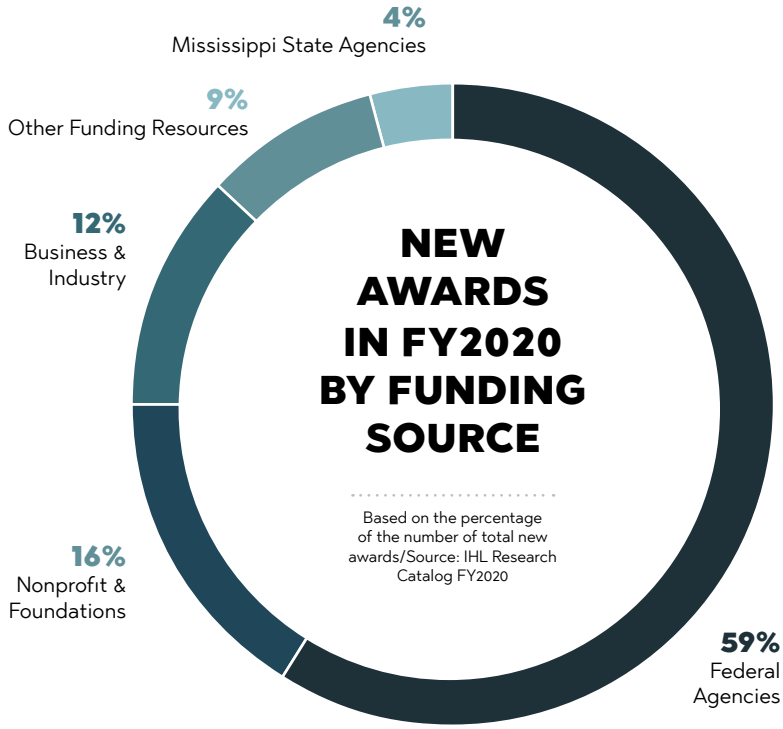
CHANGE AGENTS

UNIVERSITY OF MISSISSIPPI

and their revolutionary research

2020

UM RESEARCH



NEW AWARDS IN FY2020 BY FUNDING SOURCE

Based on the percentage of the number of total new awards/Source: IHL Research Catalog FY2020

NEW FEDERAL AWARDS IN FY2020 BY FUNDING SOURCE

Based on the percentage of the number of new federal awards/Source: IHL Research Catalog FY2020

20% National Institutes of Health

16% National Science Foundation

15% Department of Defense

10% Department of Commerce

9% Department of Agriculture

8% Department of the Interior

4% Department of Energy

3% Department of Education

3% Department of Health and Human Services

12% Total Other Federal Awards

(Other federal sources include: Corporation for National and Community Service, Department of Homeland Security, Department of Transportation, Department of the Treasury, NASA, National Endowment for the Humanities, National Historical Publications and Records Commission, Small Business Administration and U.S. Agency for International Development)

$71.3 million in new external funding awards

275 total new awards

approx. **1,050** students, staff and faculty on campus involved in externally funded research or scholarly projects

14 awards of more than $1 million

$30.2 million awarded to public service and other funding activities

$258.9 million new external funding requests

↑22.5% FROM THE PREVIOUS FISCAL YEAR

All numbers University of Mississippi/Oxford campus FY2020

Greetings

2020 was a crazy year, but even with all the turmoil, the research mission of the University of Mississippi moved forward. Our excellent researchers and administrators are creative problem-solvers and, despite having to work remotely for months, UM saw minimal impact on our research productivity. Whether focusing on analyzing data, coordinating with team members and collaborators over Zoom, writing or processing new grant applications, or working on new publication manuscripts, our people quickly found ways to stay productive and keep pushing the horizons of our knowledge.

As you peruse the 2020 edition of *Change Agents*, I think you will find compelling examples of how UM researchers are making a difference on questions that matter to the state of Mississippi, the nation and the world (and even beyond). But we don't do all this alone. The cover art shows research collaborations Ole Miss researchers have with dozens of other universities, industries and government agencies around the country. These partnerships are critical to making progress on tough problems and elevate the work we do here to the national stage. So, let me take this opportunity to thank all of our faculty, staff and students for persevering in difficult times. And let's all look forward to the new challenges and opportunities that 2021 will bring!

Josh Gladden, Vice Chancellor for Research and Sponsored Programs

UM-Grown Bacteria Journey to the Final Frontier

Bacteria grown in a University of Mississippi laboratory are zipping around the Earth approximately every 90 minutes, racing roughly 250 miles above the planet aboard the International Space Station. The microbes are part of UM biologist Patrick Curtis' research that aims to better understand how bacteria respond in weak gravity, which could lead to better bacterial control mechanisms in space and improve future spaceflights. The bacteria were included in a payload launched Oct. 2 aboard a Northrop Grumman Cygnus resupply spacecraft from NASA's Wallops Flight Facility in Virginia. Curtis' experiment is the third UM research component to visit the ISS recently, including UM-created nano-reinforced materials and a University of Mississippi Medical Center biology experiment.

Full article: UM-grown Bacteria Conquer the Final Frontier

Art History Professor Wins Hensley Award

University of Mississippi art history professor Nancy Wicker is the first recipient of a new research award that has garnered global recognition. With a $50,000 gift to the university, alumni Rusty and Missy Hensley of Memphis established the Hensley Family Senior Professor Research Award Endowment. Wicker, the inaugural recipient, used the gift to offset expenses associated with her participation in the annual meeting of the European Association of Archaeologists in Bern, Switzerland. Wicker's research focuses on the art of Scandinavia during the Early Medieval Period. The award endowment provides income to fund an annual senior professor research award within the College of Liberal Arts' four divisions: humanities, natural sciences, social sciences and fine arts.

Full article: Art History Professor Wins Hensley Award

TANDON

SHARP

UM Researchers Working on Nasal Spray to Block COVID-19

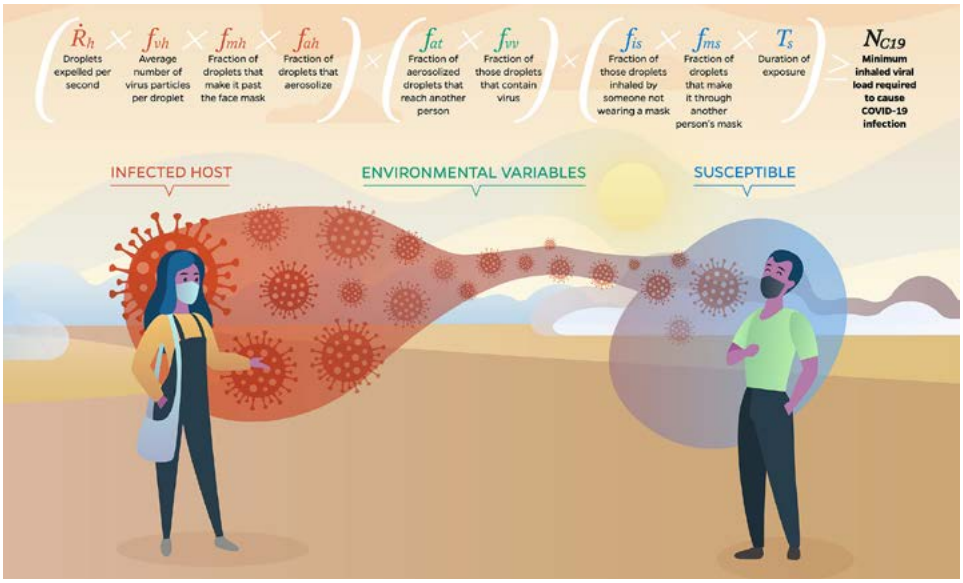
A team of researchers, including faculty from the University of Mississippi schools of Pharmacy and Medicine, is developing a treatment that could be effective at preventing the spread of COVID-19. The treatment would take the form of a nasal spray that could be prescribed by a doctor and self-administered. A daily dose of this spray could make those taking it more resistant to COVID-19. The group of researchers is led by Joshua Sharp, a UM associate professor of pharmacology, and Ritesh Tandon, an associate professor of microbiology at the University of Mississippi Medical Center. They have collaborated with a team from the Rensselaer Polytechnic Institute led by Robert Linhardt, professor of chemistry and chemical biology in the RPI School of Science.

Full article: UM Researchers Working on Nasal Spray Covid-19 Treatment

Graduate Students Find Impacts of Freshwater in Mississippi's Oysters

University of Mississippi graduate students investigated the water quality and the health of oyster reefs in the Mississippi Sound after the opening of the Bonnet Carre Spillway flooded the sound with freshwater. The spillway was opened for a record number of days in 2019 to prevent flooding, and the excess freshwater diluted the salinity of the water in the sound. To demonstrate the impact of opening the spillway, the students placed six sensor platforms in Bay St. Louis to measure water quality conditions, such as salinity and dissolved oxygen. The students found low oxygen conditions, areas of extremely low salinity and low pH, and damage from pollution, dredging and boat wakes that contributed to incredibly high stress within oyster estuaries.

Full article: Graduate Students Find Impacts Freshwater Mississippi's Oysters



Professor Helps Develop Model to Calculate Risk of COVID-19 Spread

As researchers around the world race to answer unknowns about COVID-19, a University of Mississippi professor has helped create a mathematical framework to better understand how the coronavirus spreads. Wen Wu, an assistant professor of mechanical engineering, worked with two professors at Johns Hopkins University to develop a mathematical model to estimate the risk of airborne transmission of respiratory infections such as COVID-19. The model also shows how preventive measures such as wearing masks and physical distancing protect people from transmission, and how environmental variables affect the transmission of the coronavirus. Known as the Contagion Airborne Transmission inequality, the formula was first published in an edition of the journal *Physics of Fluids*.

Full article: Professor Helps Develop Model to Calculate Risk of COVID-19 Spread

Walmart Foundation Funding Fuels New Food Prescription Program

A $442,154 grant from the Walmart Foundation is funding a University of Mississippi-led program that is expected to improve access to fresh fruits and vegetables and increase food security and food access for citizens of Charleston in Tallahatchie County. The program is intended to improve the health outcomes of entire households, as well as identify processes for spreading these kinds of programs to other communities and keeping them going once they are started. The program takes a holistic approach in providing households that lack regular access to healthy foods with fresh fruits and vegetables and nutrition counseling, as well as education on how to store, prepare and cook these items. In Mississippi, an estimated 573,600 people are food insecure, or about one in five Mississippians.

Full article: Walmart Foundation Funding Fuels New Food Prescription Program

Researchers Tackle Challenges of Safe Drinking Water in Mississippi

A group of University of Mississippi professors is working with Mississippi communities using community-based research, education and outreach to address water quality challenges. Most Mississippians receive their drinking water from a network of more than 1,100 public water systems. The smaller systems serve dozens of people, while larger ones supply tens of thousands of citizens with water. Other Mississippians obtain their water from private wells. With some of these water systems facing challenges, leaving residents and communities struggling to access clean drinking water, the interdisciplinary UM research team is focused on lead-in-drinking-water issues in both the Mississippi Delta and Jackson, working with several community partners.

Full article: Researchers Tackle Challenges of Safe Drinking Water in Mississippi

Sociologist Part of National Team Lauded for Rural Population Research

GREEN

A University of Mississippi sociology professor is part of a multidisciplinary research team that was awarded the National Excellence in Multistate Research Award from the Association of Public and Land-grant Universities and the U.S. Department of Agriculture. John Green, who is also senior research associate at the university's Center for Population Studies and co-director of the interdisciplinary minor program in society and health, was part of the team that received the highly competitive award that recognizes scientists who conduct exemplary research and outreach efforts across states and, in doing so, enhance the visibility of USDA multistate programs. The team's project involves scholars who research pressing demographic, economic, social and environmental challenges faced by rural communities.

Full article: Sociologist Part of National Team Lauded for Rural Population Research

NEZHUKUMATATHIL

English Professor Awarded Prestigious Guggenheim Fellowship

University of Mississippi English professor Aimee Nezhukumatathil was named a 2020 Guggenheim Fellow by the John Simon Guggenheim Memorial Foundation. Established in 1925, the fellowship is awarded to individuals who have already demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts. Nezhukumatathil was among 175 awardees chosen from a group of around 3,000 applicants and was the sole Guggenheim Fellow in Mississippi in 2020. She is using the fellowship's funding to focus on a new collection of poems. Nezhukumatathil's first nonfiction work, *World of Wonders: In Praise of Fireflies, Whale Sharks, and Other Astonishments*, was named Barnes & Noble's 2020 Book of the Year.

Full article: English Professor Awarded Prestigious Guggenheim Fellowship

University Creates Institute for Data Science

With the explosion of big data fueling new jobs and technologies, the University of Mississippi created the new Institute for Data Science to help educate the next generation of data scientists. The institute will attract and instruct students and others who want to develop the expertise to ethically apply data science to advance knowledge, enable enterprise and improve society. While the institute will not offer a new academic degree program, it will support and supplement educational offerings in existing UM programs such as engineering, pharmacy, business, accountancy and applied sciences. The institute also will increase entrepreneurship and external connections, foster an intellectual and engaged environment, increase research and creative achievement, and support faculty excellence.

Full article: University Creates Institute for Data Science

New Center Partners UM with Mississippi Communities

CAFER

ROSENTHAL

The University of Mississippi is home to a new center that aims to empower local communities to take charge of their community development, policy change and resilience building. Launched in April, the UM Community First Research Center for Wellbeing and Creative Achievement, or UM: CREW, is a resource for Mississippi communities – from counties and cities to groups of citizens – to create, access, analyze and apply knowledge and data to improve community well-being and local and regional decision-making. The co-directors of the new center are Anne Cafer, assistant professor of sociology, and Meagen Rosenthal, associate professor of pharmacy administration. Not yet a year old, the center is already working with partners in Mississippi and elsewhere.

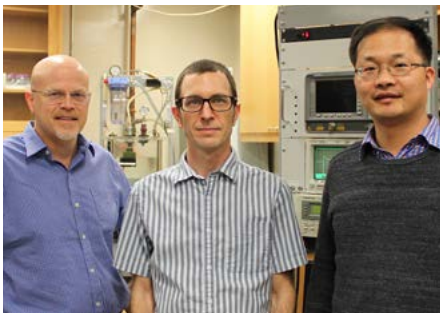
Full article: New Center Partners UM with Mississippi Communities

Chemistry Professors Receive NSF Award to Explore Lower-Energy Light

Two University of Mississippi professors received a $550,000 National Science Foundation award to further explore using lower-energy light to drive systems that will improve daily life. With hundreds of devices working by absorbing light and then using that energy, instruments that could be improved by the professors' research include solar cells, solar-charging batteries, night vision technologies and infrared cameras. The two professors are Jared Delcamp, associate professor of chemistry and biochemistry, and Nathan Hammer, professor of chemistry and biochemistry. The two professors also will use the award to conduct outreach activities with the general public and several student groups to encourage science, technology, engineering and mathematics involvement.

Full article: Chemistry Professors Receive NSF Award to Explore Lower-Energy Light

UM Scientists Discover Novel Method for Catching, Maneuvering Droplets



In a scene seemingly ripped from science fiction, University of Mississippi researchers at the National Center for Physical Acoustics announced they were able to sonically capture a droplet of liquid and move it without any direct or mechanical contact, using only acoustic waves. The revolutionary research was published in a 2020 *Physical Review Applied* paper. The ultrasonic extraction and manipulation of the droplets are performed using a technique called near-field acoustic tweezers, which essentially uses sound as an invisible force field and is a new capability using the well-known tweezer phenomenon. The droplets being pulled out of a surface and then staying trapped by the sound waves is the key novelty. The work has useful applications in chemistry or biology laboratories, biotechnology spheres and other fields.

Full article: UM Scientists Discover Novel Method for Catching, Maneuvering Droplets

UM Researchers Working to Detect, Track Tornadoes

University of Mississippi researchers at the National Center for Physical Acoustics are studying how to detect and track tornadoes by using UM-designed sensors that record infrasonic signals, or infrasound – acoustic signals at frequencies below what humans can hear. Tornadoes are known to generate these low-frequency sounds, although the exact mechanism for this production is not understood. But UM researchers are hoping that by "hearing" tornadoes through infrasound, they might develop technology to revolutionize the detection and tracking of tornadoes and greatly improve tornado warning methods. The research is an outgrowth of the center's examinations of the uses of infrasound, which also is generated by hurricanes, atmosphere-ocean interactions and explosions.

Full article: UM Researchers Working to Detect, Track Tornadoes

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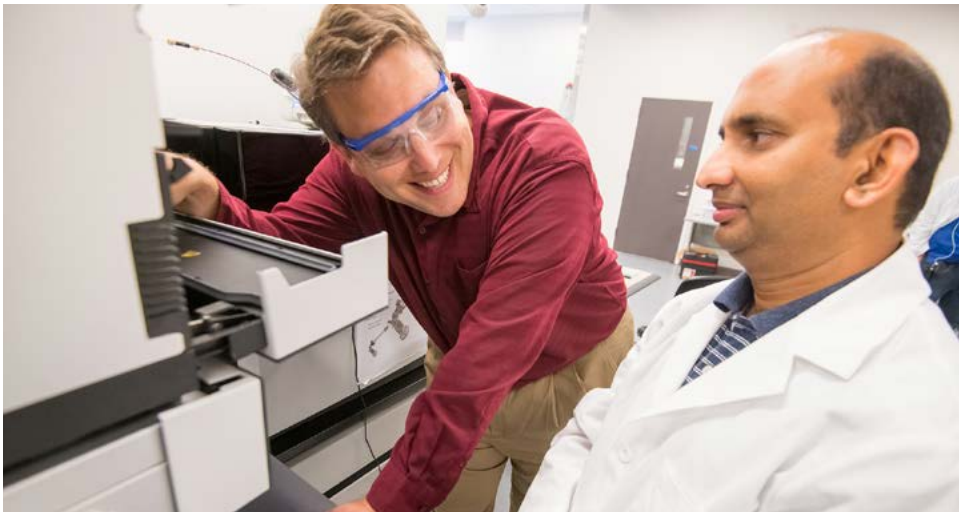

$10.5M Grant Creates Glycoscience Research Center at Pharmacy School

The University of Mississippi received a $10.5 million Centers of Biomedical Research Excellence Phase I grant from the National Institutes of Health to establish a new center dedicated to glycoscience. The Glycoscience Center of Research Excellence, known as GlyCORE, will study how carbohydrates and carbohydrate-containing molecules affect human health. By directly funding select research projects, establishing mentors for early-career investigators, aiding in the recruitment of new faculty in glycoscience and bringing together investigators for local and regional meetings, GlyCORE will be a boon to researchers at the university and throughout the Mid-South, including affiliated researchers working on heart disease, antiviral strategies, antibiotics, diabetes and HIV.

Full article: Glycoscience Research Center Established at School of Pharmacy

Oxford-UM Economic Relationship Hailed by Institute

A 2020 report from an economic renewal institute praised the partnership of the University of Mississippi and the city of Oxford for building an entrepreneurial ecosystem that fosters strong growth for long-term economic success. The "Young Firms and Regional Economic Growth: Knowledge-Intensive Entrepreneurs Critical" report was released by Heartland Forward, a "think-and-do tank" based in Bentonville, Arkansas. The institute focuses on improving economic performance in America's heartland, comprising 20 states in the south central U.S. and Midwest. Oxford ranked 12th in the report's overall ranking of young firm activity for the country's top 50 micropolitans, or urban areas with a population between 10,000 and 50,000 people. The ranking was the highest of any heartland micropolitan.

Full article: Economic Renewal Institute Hails Oxford-UM Relationship